

**WHAT IS CLAIMED IS:**

1. A slurry for chemical mechanical polishing (CMP) a metal  
surface of a semiconductor substrate with a polyurethane free  
thermoplastic foam polishing body, comprising,  
an acid buffer that maintains said slurry at a pH between  
about 2.5 and about 4.0 during polishing of a metal surface on a  
semiconductor substrate; and  
an abrasive particle stabilizer.

2. The slurry as recited in Claim 1, wherein said pH is  
between about 2.7 and about 3.2.

3. The slurry as recited in Claim 1, wherein said pH is  
between about 3.5 and about 4.0.

4. The slurry as recited in Claim 1, wherein said abrasive  
particle stabilizer comprises molecules that are equivalent to  
repeating units of polymers comprising abrasive particles in said  
slurry.

5. The slurry as recited in Claim 4, wherein said abrasive  
particles comprise colloidal silica particles and said abrasive  
particle stabilizer comprises silicic acid and silicic salt.

6. The slurry as recited in Claim 5, wherein a ratio of said  
silicic acid to said silicic salt is between about 100:1 and 1:100.

7. The slurry as recited in Claim 4, wherein said abrasive  
particles comprise alumina and said abrasive particle stabilizer  
comprises aluminate salts.

8. The slurry as recited in Claim 1, further including an  
oxidant and a passivation agent.

9. The slurry as recited in Claim 8, wherein said passivation  
agent is generated *in situ* from a reaction between said metal  
surface and said oxidant.

10. The slurry as recited in Claim 9, wherein said oxidant is  
potassium iodate ( $\text{KIO}_3$ ) said passivation agent is iodine ( $\text{I}_2$ ) and  
said metal surface includes copper.

11. The slurry as recited in Claim 9, further including a  
second passivation agent that is not generated *in situ* wherein said  
passivation agent and said second passivation agent synergistically  
interact with said metal surface to retard corrosion of said metal  
surface.

12. A chemical mechanical polishing (CMP) system comprising,  
a slurry comprising an acid buffer that maintains said slurry  
at a pH between about 1 and about 6 during polishing of a metal  
surface on a semiconductor substrate; and  
a polishing pad that includes a polishing body having a  
polyurethane-free thermoplastic foam substrate that cooperates with  
said slurry to remove portions of said metal surface during said  
polishing.

13. The CMP system as recited in Claim 12, wherein said metal  
surface comprises copper and copper oxides, and wherein said slurry  
maintain a higher ratio of said copper to said copper oxides as  
compared to said ratio in a non-acidic slurry.

14. The CMP system as recited in Claim 12, wherein said  
polishing body further includes said thermoplastic foam substrate  
having a surface comprised of concave cells and a polishing agent  
coating an interior surface of said concave cells.

15. The CMP system as recited in Claim 12, wherein said  
thermoplastic foam substrate comprises a closed-cell foam of  
crosslinked homopolymer or copolymers.

16. The CMP system as recited in Claim 12, wherein said

closed-cell foam is comprised of a blend of cross-linked ethylene vinyl acetate copolymer and a low or medium density polyethylene copolymer having a ethylene vinyl acetate:polyethylene ratio between about 1:9 and about 9:1.

17. The CMP system as recited in Claim 12, wherein said polishing body has a hardness of between about 30 shore A and about 80 shore A.

18. The CMP system as recited in Claim 12, wherein said polishing pad is capable of polishing said metal surface at a removal rate of at least about 2000 Angstroms/minute using a down force of about 20 kPa, a table speed between about 25 rpm and a carrier speed of about 40 rpm.

19. The CMP system as recited in Claim 18, wherein said removal rate has a within wafer non-uniformity of less than about 14%.

20. The CMP system as recited in Claim 18, wherein said removal rate is at least about 1000 Angstroms/minute and said removal rate has a within wafer non-uniformity of less than about 4%.